

REMARKS

Reconsideration of this application and the rejection of claims 6-8 are respectfully requested. Applicant has attempted to address every objection and ground for rejection in the Office Action dated July 18, 2011 (Paper No. 20110715) and believes the application is now in condition for allowance. The claims and the specification have been amended to more clearly describe the present invention.

In the Action, claims 6-8 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, the Examiner states that certain of the claims include a broad range and a narrow range that falls within that broad range. Furthermore, the Examiner states that the claims include terms such as "high" and "later" that are relative terms and therefore unclear. Applicant has amended the claims to remove these terms as shown above.

Claims 6-8 are rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of U.S. Patent No. 3,055,104 to Lyon and Japanese Patent Document No. 04063247A to Murata et al. Applicant disagrees with and traverses this rejection for the following reasons.

Lyon discloses a method of preparing steel blanks that includes ingot pieces 11 that are pressed at a temperature from 2000°F to 2300°F (Col. 3, lines 22-26). JP '247 is cited as teaching a high silicon steel and a step of applying a second load application at a reduced temperature.

In contrast, amended claim 6 recites, among other things, a process for manufacturing a silicon stainless steel which comprises the step of forging a silicon stainless steel containing Si in 3.5 to 7.0% by weight or a master alloy thereof where the forging step includes “a load application step for applying one of an impact load and a static load to one of the silicon stainless steel and the master alloy, wherein a surface temperature of the silicon stainless steel or the master alloy is kept at 1,100°C or higher, and is dropped to a temperature range of 950°C or below and not so low as to break the silicon stainless steel or the master alloy, such that the process provides a steel material which mainly comprises a microstructure with a grain size of 15 μm or less.” The cited combination fails to disclose or suggest such subject matter.

The method in Lyon intends to prepare steel blanks for drawing of shells directly from sections of a steel ingot while minimizing scrap and surface impurities. The ingot is composed of standard steel ranging from SAE 1010 to 1050 containing 0.08 to 0.56% carbon, 0.30 to 1.65% manganese, a maximum of 0.04% phosphorus and a maximum of 0.05% sulfur, and the sections are forged at temperatures of 2000°F to 2300°F. Forging at temperatures of 2000°F to 2300°F is a well-known technique. Lyon does not disclose that

the steel includes Silicon or that any metal is used having the Silicon content defined in amended claim 1.

Murata fails to remedy the deficiencies of Lyon. Although Murata discloses a process for treating high strength high ductility stainless steel, it is actually directed to a method concerning repeated cold rolling and subsequent annealing so as to increase the ductility of stainless steel. The steel disclosed in Murata is completely different from the hot-rolled steel disclosed by the present application and defined in amended claim 1.

When standard steel is treated by repeated cold rolling and subsequent annealing, its ductility is substantially increased, and therefore standard steel is treated because it is used for exterior body panels of cars or cans of canned goods, etc., that are made by deep drawing. However, standard steel treated by hot rolling is not suitable for such deep drawing because of its low ductility. In high silicone stainless steel, cold-rolled steel and hot-rolled steel are completely different.

JP 62124218, which is cited by Murata, includes an example of cold-rolled high silicone stainless steel that contains 4.1 wt% Si and shows elongation of 17%. Even in high silicone stainless steel, this level of elongation can be obtained if the steel is cold rolled. As described in Murata, the steel treated by cold rolling and subsequent annealing is

transformed to a martensite single-phase structure, and applying repeated annealing to the steel develops an austenite single-phase structure or a two-phase structure of an austenite phase and a martensite phase, whereby the steel obtains high strength and high ductility.

On the contrary, the forging of the claimed invention includes hitting metal with a hammer (impact load) while heating it so as to apply pressure to metal, so that the spaces inside the metal are broken, and crystals of metal are refined and oriented to a certain direction, whereby the strength of the metal is increased as well as the metal is formed into a desired shape. Therefore, the steel disclosed in the claimed invention has a completely different metallic structure compared to that of Murata. Moreover, the steel disclosed by Murata has better characteristics than that of the claimed invention because Murata's method includes more steps in treating the steel than the claimed invention, but is much more expensive.

Additionally, forging at temperatures of 2000-2300°F, which is called hot forging, is a well-known technique from ancient times, and therefore the technique is not the one taught by Lyon. In fact, gold, silver or copper were forged to make artifacts in ancient Egypt and Mesopotamia more than 6000 years ago. Also in Japan, gunsmiths forged metal to make gun barrels of muskets, and sword-smiths have used forging process for making Japanese swords. Japanese forging techniques have developed in accordance with sword-smiths' efforts for improving quality of edged tools.

Forging is a kind of plasticity processing of metal, in which metal is hit with a

hammer while heated, so that the spaces inside the metal are broken, and crystals of metal are refined and oriented to a certain direction, whereby the strength of the metal is increased as well as the metal is formed into a desired shape.

Hot forging is the forging that is made at temperatures higher than the recrystallization temperature. While the recrystallization temperature of pure iron is 630°C and that of standard steel is 900°C, metal is generally treated at temperatures of 1100-1250°C in hot forging.

In Lyon, the heat is used to avoid lowering the temperature of the flattened disk blank unduly before trimming and cupping is made. However, Lyon fails to disclose or teach heating an ingot. The purpose of heating in the claimed invention is to maintain the desired temperature of high-silicon stainless steel for avoiding breaks of the steel while loads are applied to the steel so as to refine the structure of the steel. The purpose of heating therefore is different between the claimed invention and Murata.

Also, although the examiner pointed out that Murata provides “different secondary deformations for high-Si stainless steel under different operation temperatures to obtain different forging results,” Murata discloses the treatment by cold rolling and subsequent annealing as explained in the above and does not employ the technique of forging at all.

Additionally as explained above, Lyon relates to forging of standard steel, and has no relation with the subject matter of the claimed invention, which provides a technique

to control a grain size of high silicon stainless steel. The examiner's statement, "JP'247 further teaches to control the grain size by forging to obtain fine grains of less or equal to 1 μ m," shows that the Examiner misunderstands the invention of Murata. Murata's method controls a grain size not by forging but by treatment by cold rolling and subsequent annealing.

Moreover in the Action, the Examiner states that "[s]till regarding claim 8, US'104 teaches gradually compressing and flatten (Col.3, lines 45-53 of US'104) and US'104 teaches the temperature of second loading is lower than the temperature of the first loading (claims 2 and 4 and Col.4, lines 11-38 of US'104), which reads on the limitation that a lowest surface temperature of each second loading application step is lower than a lowest surface temperature for a previous step as recited in the instant claim." (see pages 6-7).

The "gradual compressing and flattening" disclosed in Lyon has no relation with the content of the claimed invention. The claimed invention does not intend to obtain good-shaped blanks as disclosed in Lyon. Instead as explained in the above, the purpose of heating the stainless steel or alloy in the claimed invention is completely different from the heating disclosed by Lyon.

For the above reasons, Applicant submits that the combination of Lyon and Murata fails to disclose the load application steps of amended independent claims 6 and 7. Accordingly, Applicants submit that amended claims 6 and 7, and claim 8 which depends

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from claim 7, are each patentably distinguished over the cited combination and in condition for allowance.

Applicant submits that in view of the above-identified amendments and remarks, the claims in their present form are patentably distinct over the art of record. Allowance of the rejected claims is respectfully requested. Should the Examiner discover there are remaining issues which may be resolved by a telephone interview, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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